Docket No.: 32011-236449

(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Lomaev et al.

Art Unit: Not Yet Assigned

Application No: Not Yet Assigned

Examiner: Not Yet Assigned

Confirmation No: Not Yet Assigned

Filed: Concurrently Herewith

Atty. Docket No: 32011-236449

For: DIELECTRIC BARRIER DISCHARGE EXCIMER LIGHT SOURCE

Customer No:
26694
26694
PATENT TRADEMARK OFFICE

INFORMATION DISCLOSURE STATEMENT (IDS)

MS PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to 37 CFR 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement accompanies the new patent application submitted herewith.

A summary/abstract translation of the non-English language references is enclosed.

In accordance with 37 CFR 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 CFR 1.98(a)(2).

A concise explanation of relevance of the items listed on form PTO/SB/08 is in the form of an English language copy of a Search Report from a foreign patent office, issued in a counterpart application, which refers to the relevant portions of the references.

Relevance of the non-English language reference(s) is discussed in the present specification.

In accordance with 37 CFR 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 CFR 1.56(a) exists. In accordance with 37 CFR 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 22-0261, under Order No. 32011-236449. A duplicate copy of this paper is enclosed.

Dated: September 27, 2006

Respectfully submitted,

By _____ 42709

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Substitute for form 1449A/B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	Not Yet Assigned 10/594386
Filing Date	Concurrently Herewith
First Named Inventor	Mikhail I. Lomaev
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Attorney Docket Number	32011-236449

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	AA*	US-6,052,401	04-18-2000	Wieser et al.	
	AB*	US-6,400,089	06-04-2002	Salvermoser et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	BA	JP-5-174792	07-13-1993	Asea Brown Boveri AG		√
	BB	JP-2002-319369	10-31-2002	Toshiba Lighting & Technology Corp.		√
	BC	JP-2001-185089	07-06-2001	Quark Systems Kabushiki		√
	BD	JP-11-265688	09-28-1999	Resonance Ltd.		√
	BE	JP-5-174793	07-13-1993	Asea Brown Boveri AG		√
	BF	JP-2002-298790	10-11-2002	Shin'etsu Engineering Kabushiki Kaisha		√

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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	CA	Zaidel et al., "VUV Spectroscopy", Moscow "Nauka", 1967.	
	CB	Schischatskaya et al., "VUV Lamps with a Large Emitting Surface", Optical Journal, Vol. 65, No. 12, pp. 93-95, 1998.	
	CC	Tanaka "Continuous Emission Spectra of Rare Gasses in the Vacuum Ultraviolet Region", J. Opt. Soc. Am., Vol. 45, No. 9, pp. 710-713, 1955.	
	CD	Volkova et al., "VUV Irradiation Lamp" Bul. of Inventions, 1982, No. 41, p. 179.	
	CE	Kogelschatz "Silent-Discharge Driven Excimer UV Sources and Their Applications" App. Surf. Sci., Vol. 54, pp. 410-423, 1992.	
	CF	Salvermoser et al., "Efficient, Stable, Corona Discharge 172 nm Xenon Excimer Light Source" J. Appl. Phys., Vol. 94, No. 6, pp. 3722-3731, 2003.	
	CG	Vollkommer et al., "Dielectric Barrier Discharge" The 8th International Symposium on Science and Technology of Light Sources LS-8, Greifswald, Germany, pp. 51-60, 1998.	
	CH	Mildren et al., "Enhanced Performance of a Dielectric Barrier Discharge Lamp Using Short-Pulsed Excitation" J. Phys. D: Appl. Phys. Vol. 34, pp. L1-L6, 2001.	
	CI	Esrom et al. "Metal Deposition with a Windowless VUV Excimer Source" Appl. Sur. Sci. Vol. 54, p 440, 1992.	

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[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

Examiner Signature		Date Considered	

References disclosed in the description

process. In addition, it is necessary to use a pulse source with a short voltage rise time and to realize a homogeneous discharge. The light source described in Non-patent Reference 7 has a Xe gas sealed therein, comprises a metallic rod-like cathode, and is sealed with a fused quartz (Suprasil quartz-type: fused quartz marketed under a trade name Suprasil). The anode has a structure in which a mesh is disposed on the outer surface of the fused quartz tube.

Inside the discharge tube of this light source, the discharge current flows between a plurality of electrodes, cathodes and anodes are disposed alternately parallel to each other, and a radiation is generated form the discharge plasma of the gas. In case of light sources using Ar gas or Kr gas (the wavelength of emission caused by the B-X transition is 126 nm and 146 nm, respectively), the light with a wavelength of 160 nm or less is absorbed by the fused quartz. Therefore, the configuration of a light source in which the Ar gas or Kr gas and the electrodes are sealed with fused quartz is unsuitable.

The light sources disclosed in Non-patent References 5 and 9 do not have a window for picking out the radiation. Thus, they are not constructed as a light source in which the Ar gas or Kr gas and the electrodes are sealed with fused quartz. The discharge is initiated between the anode and cathode electrodes arranged in a row parallel to each other in the longitudinal direction and mutually connected and a dielectric tube surrounding the electrodes. The disadvantage of the light source of such a configuration with respect to the light source disclosed in Non-patent References 7 is that a voltage (insulation breakdown voltage) at which the discharge is initiated becomes higher as the pressure of the gas contributing to the light emission decreases.

[Non-patent Reference 1] A. N. Zaidel, E. Ya. Schreider, VUV spectroscopy, Moscow "Nauka", 1967.

[Non-patent Reference 2] L. P. Schischatskaya, S. A. Yakovlev, G. A. Volkova, VUV lamps with a large emitting surface, Optical Journal, Vol. 65, No. 12, pp.93-95, 1998.

[Non-patent Reference 3] Y. Tanaka, Continuous emission spectra of rare gases in the vacuum ultraviolet region, J. Opt. Soc. Am. Vol. 45, No. 9, pp.710-713, 1955.

[Non-patent Reference 4] G. A. Volkova, N. N. Kirillova, E. N. Pavlovskaya, I. V. Podmoschenskii, A. V. Yakovleva, VUV irradiation lamp. Bul. of Inventions, 1982, No. 41 p. 179.

[Non-patent Reference 5] U. Kogelschatz, Silent-discharge driven excimer UV sources and their applications, Appl. Surf Sci, Vol. 54, pp. 410-423, 1992.

[Non-patent Reference 6] M. Salvermoser, D. E. Murnick, Efficient, stable, corona discharge 172 nm xenon excimer light source, J. Appl. Phys. Vol. 94, No. 6, pp. 3722-3731, 2003.

[Non-patent Reference 7] F. Vollkommer, L. Hitzschke, Dielectric Barrier Discharge, The 8th International. Symposium on Science and Technology of LIGHT SOURCES LS-8, Greifswald, Germany, pp. 51-60, 1998.

[Non-patent Reference 8] R. P. Mildren, R1 J. Carman, Enhanced performance of a dielectric barrier discharge lamp using short-pulsed excitation, J. Phys. D: Appl. Phys. Vol. 34, pp. L1-L6, 2001.
[Non-patent Reference 9] H. Esrom and U. Kogelschatz, Appl. Surf. Sci. Vol. 54, p. 440, 1992.
[Patent Reference 1] U.S. Patent No. 6,052,401
[Patent Reference 2] U.S. Patent No. 6,400,089

[Disclosure of the Invention]

[Problems to be Solved by the Invention]

It is an object of the present invention to provide a VUV light source for realizing high-efficiency light emission and to provide a spontaneous emission light source in which the absorption of radiation by the walls of the discharge tube is prevented and high-brightness light with a wavelength in the VUV region can be obtained. Yet another object is to provide the structure of cathode and anode which allows for efficient illumination of the object (illumination object) which is to be illuminated with the light with a wavelength in the VUV region.

[Means fore Solving the Problems]

The first dielectric barrier discharge excimer light source in accordance with the present invention comprises an anode having a dielectric body and an anode electrode covered with the dielectric body and composed of a straight elongated hollow cylindrical body and an elongated cathode surrounding the anode. The cathode comprises a straight semicylindrical body and a cathode wire group composed of a plurality of wires fixed parallel to each other to the semicylindrical body. The anode and the cathode are disposed parallel to each other in the longitudinal direction. A reflective surface for reflecting the radiation in a vacuum ultraviolet spectral region is formed on the surface of the cathode at the side facing the anode.

The second dielectric barrier discharge excimer light source in accordance with the present invention comprises an anode having a dielectric body and an anode electrode covered with the dielectric body and composed of a straight elongated hollow cylindrical body and an elongated cathode surrounding the anode. The cathode comprises a straight semitubular rectangular body composed of three surfaces and having a U-shaped cross section perpendicular to the longitudinal direction and a cathode wire group composed of a plurality of wires fixed parallel to each other to the semitubular body. The anode and the cathode are disposed parallel to each other in the longitudinal direction. Further, a reflective surface for reflecting the radiation in a vacuum ultraviolet spectral region is formed on the surface of the cathode at the side facing the anode.

The third dielectric barrier discharge excimer light source in accordance with the present invention comprises an anode having a dielectric body and an anode electrode covered with the dielectric body and composed of an elongated hollow tubular body composed of four surfaces and